ENVIRONMENTAL MONITORING FUEL OIL STORAGE 1,600-AREA FORT DEVENS AYER, MASSACHUSETTS

Prepared for:
Department of the Army
New England Division
Corps of Engineers
Waltham, Massachusetts

Prepared by: Goldberg-Zoino & Associates, Inc. Newton Upper Falls, Massachusetts

> File No. U-10391.9 January 1989





The GEO Building 320 Needham Street Newton Upper Falls, MA 02164 (617) 969-0050

January 4, 1989 File No. U-10391.9-C

Division Engineer
Department of the Army
New England Division, Corps of Engineers
424 Trapelo Road
Waltham, Massachusetts 02254-9149

Attention: Mr. Yuri Yatsevich

Re: Environmental Monitoring
Fuel Oil Storage 1,600-Area
Fort Devens
Ayer, Massachusetts

Gentlemen:

Goldberg-Zoino and Associates, Inc. (GZA) has completed observation of soil removal performed at fuel oil storage 1600-Area at Fort Devens in Ayer, Massachusetts, and reviewed results of associated soil analyses for petroleum hydrocarbons. In accordance with a proposal dated October 18, 1988, GZA evaluated the degree of oil contamination present in soils in the tank yard area using visual, odor and instrument measurement criteria, observed excavation of crushed stone and sand that was determined to be contaminated using these criteria, and performed laboratory analyses for total petroleum hydrocarbons. This letter report is subject to the general limitations presented in Appendix A.

These services were provided under contract with the Department of the Army, New England Division, Corps of Engineers; contract number DACA33-87-D-0003, Delivery Order No. 9.

FIELD ACTIVITIES

The site was formerly the location of seven aboveground 10,000 gallon No. 2 fuel oil tanks, underlain by crushed stone, sand, and a polyethylene liner. Excavation of contaminated crushed stone and sand was performed on October 21, 1988 by the U.S. Army. GZA field services were provided by Mr. Richard Levergood. GZA observed in-situ soil conditions, and assessed the soil for evidence of oil contamination using visual and odor criteria and field screening for volatile organic compounds (VOCs). A jar headspace technique was employed for the field screening, using a 10.2 eV photoionization detector (H-Nu Model PI-101).

Department of the Army - January 4, 1989 - File No. U-10391.9 Page 2

The attached field sketch shows the approximate locations where field screening of in-situ soil was performed. Instrument readings greater than 10 parts per million (ppm), visible staining, and the presence of a petroleum odor were used as criteria to identify oil contaminated soil. Soil determined to be contaminated by these criteria was excavated by the U.S. Army using a front-end loader. The areas where excavation was performed are shown in Figure 1 (Areas 1 through 6B). Excavated soil was removed from the immediate area for management by the U.S. Army. A field report summarizing work performed is included in Appendix B.

A total of six composite soil samples (S-1 through S-6) were obtained at the limits of the excavated areas after work was completed on October 21, 1988. The samples were submitted to Water Control Laboratories of Hopkinton, Massachusetts for total petroleum hydrocarbon (TPH) analyses.

RESULTS

Table 1 summarizes results of VOC field screening of in-situ soil. Screening indicated VOC concentrations in the jar headspace of 0 to 40 ppm. Areas of soil were excavated where screening indicated concentrations greater than 10 ppm. Soil areas where screening indicated less than 10 ppm was left in place.

Laboratory reports of TPH analyses are included in Appendix C. The results indicate the soil samples contained 26 to 507 mg/kg total petroleum hydrocarbons. Each sample submitted to the laboratory for TPH analysis was also field screened for VOCs using the jar headspace technique. Table 2 summarizes H-Nu field screening results and corresponding TPH analytic results. Field screening indicated VOC concentrations in the jar headspace of 0 to 10 ppm.

For the purpose of comparison, the December 1987 Massachusetts Department of Environmental Quality Engineering (DEQE) policy guideline sets a remediation goal of 100 ppm on soil contaminated with virgin fuel oil. This is not a regulatory standard; the DEQE may set site specific remedial goals as appropriate.

This letter concludes our activities on this project. We trust that the information presented here satisfies your requirements.

Department of the Army - January 4, 1989 - File No. U-10391.9
Page 3

We have appreciated the opportunity to assist you with this project, and look forward to continued involvement with the Army Corps of Engineers.

Very truly yours,

GOLDBERG-ZOINO & ASSOCIATES, INC.

Roger P. Thebauto Roger P. Thibault Project Manager

Principal

Joseph D. Guertin, Jr.

Sara Hanna

Consultant/Reviewer

RPT:SH:JDG/idm

Attachments: Tables

Figures

Limitations Field Report

Contract Laboratory Results

TABLES

TABLE 1

RESULTS OF VOLATILE ORGANIC COMPOUND FIELD SCREENING

	VOC Headspace Concentration		Approximate Depth from	
No.	(ppm)	Area	Ground Surface (in.)	Notes ²
			,	
1	0	1	8	Residual
2	0	1	8	Residual
3	40	2	8	Excavated
4	11	2	6	Excavated
5	0	1	6	Residual
6	0	1	6	Residual
7	0	1	6	Residual
8	0	1	6	Residual
9	2	2	6	Residual
10	0	2	6	Residual
11	0	2	6	Residual
12	40	6A	6	Excavated
13	0	6A	6	Residual
14	0	6A	6	Residual
15	0	6A	6	Residual
16	20	2	6	Excavated
16A	0	2	6	Residual
17	1	2	6	Residual
18	0	2	6	Residual
19	0	2	9	Residual
20	11	6A	6	Excavated
21	0	6A	6	Residual
22	0	6A	8	Residual
23	14	6B	8	Excavated
24	0	6B	6	Residual
25 26	12	5	6	Excavated Excavated
26 27	14 0	5 5	8 6	Residual
28		5 5	8	Residual
28 29	0 0	6B	36	Residual
30	0			Residual
31	0	4	6 6	Residual
31 32	7	4 3	6	Residual
33	15	3	6	Excavated
33A	3	3	6	Residual
34	34	3	6	Excavated
24	J4	J	U	LACUVALEU

TABLE 1 (CONT'D)

Notes:

- 1. Total volatile vapor analysis performed on samples employing H-Nu Model PI-101 photoionization analyzer. Samples were collected in 8 oz. glass jars and sealed, allowing vapor to collect in headspace. Volatile organic vapor in headspace was tested in the field. The H-Nu results represent relative total organic vapor levels referenced to a benzene standard.
- 2. "Residual" indicates soil remaining at the limits of excavation upon completion.

TABLE 2

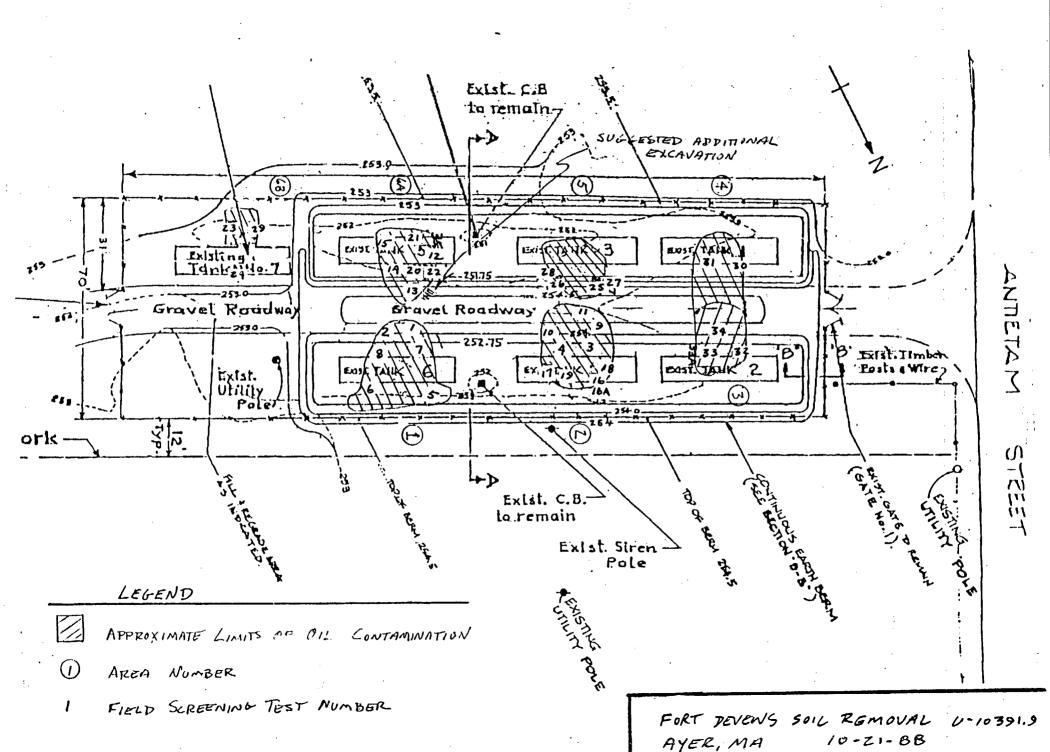
SAMPLES SUBMITTED FOR
TOTAL PETROLEUM HYDROCARBON (TPH) ANALYSIS

Sample No.	Sample Source	H-Nu Field Screening Results (ppm)	TPH Analytic Results ² (mg/kg)
ss-1	Area 1	0	26
SS-2	Area 2	0	39
SS-3	Area 3	0	110
SS-4	Area 4	4	507
SS-5	Area 5	0	115
SS-6	Areas 6A, 61	3 10	380

Notes:

- 1. Total volatile vapor analysis performed on samples employing H-Nu Model PI-101 photoionization analyzer. Samples were collected in 8 oz. glass jars and sealed allowing vapor to collect in headspace. Volatile organic vapor in headspace was tested in the field.
- 2. Analysis was performed by Water Control Laboratories of Hopkinton, Massachusetts. Results added to report on November 8, 1988.

FIGURES



APPENDIX A

LIMITATIONS

APPENDIX A

LIMITATIONS

- 1. The analyses and recommendations submitted in this report are based on part upon the data obtained from surface explorations. Variations between these explorations may become evident with further investigation. If such variations appear, it will be necessary to reevaluate the recommendations and conclusions of this report.
- 2. The analysis, recommendations, and conclusions submitted in this report are based upon chemical data and are contingent upon their validity. These data have been reviewed and interpretations made in the text and on the figures included with this report. It should be noted that fluctuations in the types and levels of contaminants and variations in their flow paths may occur due to seasonal water fluctuations, past practices used in disposal, as well as other factors.
- 3. Chemical analyses have been performed for a specific number of parameters during the course of this study, as detailed in the text. It must be noted that additional constituents not searched for during the current study may be present in soil and groundwater at the site.

APPENDIX B

FIELD REPORT

FIELD SUMMARY

DATE 1	0/21/88		REPO	DRT 1	10.	1		FILE	NO.	U-1039	91.9
PROJECT	Fort	Deven	s Soil	Remo	val	LOCA	TION	Ave	er, M	[A	
CLIENT _	II S A	rmy C	orps of	Eng	ineers	CON	TRAC'	TOR	U.S.	Army	
WEATHER	CONDITE:	TONG	Cloudy	50	10						
WEATHER ATTACHMI	CONDII.	iold	Croudy Ckotch	and	Tahles	1 a	nd 2				
ATTACHMI	7112 <u>r</u>	reid '	SKeccii	anu	Tables	<u> 1 u</u>	114 2				

- 1. Arrived on site at 0730 hours.
- 2. Equipment Working:
 - a. 1- 6-Wheel Dump Truck
 - b. 1- Front-End Loader
- 3. Work Performed:

At the request of Mr. Yuri Yatsevich (U.S. Army Corps of Engineers), the undersigned arrived on site to observe removal of oil contaminated soil from a fuel oil storage tank yard. Soil was assessed for evidence of oil contamination using visual, odor, and jar headspace criteria. A 10.2 eV photoionization analyzer (H-Nu model PI-101) was employed in the jar headspace technique. Instrument readings greater than 10 ppm, visible staining and the presence of a petroleum odor were used as criteria to identify oil contaminated soil.

The fuel oil storage tanks had been removed from the site prior to arrival of the undersigned. Fill within the limits of the tank yard consisted of approximately 12-inches of surficial crushed stone, underlain by approximately 6-inches of sand and a single layer of plastic liner. The contractor had previously excavated some crushed stone and sand in Areas 1 and 2.

The undersigned was accompanied by Mr. Harish Sharma (U.S. Army) throughout the day while excavation was being performed. Field screening of residual crushed stone and sand above the plastic liner in Areas 1 and 2 indicated total volatile organic compound (VOC) concentrations exceeding 10 ppm in the jar headspace. Field screening of crushed stone and sand in Areas 3, 4, 5, 6A and 6B also indicated VOC concentrations exceeding 10 ppm. The crushed stone and sand appeared stained in some areas. Stained areas were localized and generally not well defined. A faint to strong petroleum odor was present. Approximate limits of oil contamination, as defined by visual, odor and 10 ppm instrument reading criteria, are shown on the Field

Sketch. Oil contamination appeared limited to fill material above the plastic liner.

The contractor excavated soil in these areas until H-Nu readings less than 10 ppm were obtained in the residual soil. Approximate depth of excavation varied between 6 and 18-inches in Areas 1, 2, 3, 4, 5, and 6A. Excavation depth in Area 6B, where a well defined area of darkly stained soil was removed, varied from 12- to 48-inches. Table 1 summarizes field screening test results obtained in excavated and residual soil in each area. The Field Sketch shows approximate locations of these tests.

At the request of Ms. Beverly Eloian (U.S. Army), 6 samples of residual fill above the plastic liner were obtained at the limits of the excavation in Areas 1 Each sample is a composite of several through 6B. subsamples of material from a given area. Areas 6A and 6B were combined into one sample. Table 2 summarizes sample numbers, source areas, and the results of field screening performed on the composite samples. screening indicated VOC concentrations in the headspace were less than 10 ppm for samples SS-1 through SS-5, and 10 ppm for sample SS-6. The undersigned suggested to Mr. Sharma extension of the lateral limits of excavation in Area 6A, as shown on the Field Sketch. A faint petroleum odor was detected at this location at the end of the day.

The samples were delivered to Water Control Laboratories of Hopkinton, Massachusetts on October 25, 1988 for Total Petroleum Hydrocarbon (TPH) analysis. Analytic results were received by GZA on November 7, 1988, and are listed in Table 2.

4. Left site at 1630 hours.

ON-JOB TIME	8.5	
TRAVEL TIME	1.0	
OFFICE TIME	1.0	
TOTAL TIME	10.5	-

Richard Lev	vergood
PREPARED	ВУ
CHWHTVHG	RV

APPENDIX C

CONTRACT LABORATORY REPORTS



WATER CONTROL LABORATORIES ADVISION OF COOPERATING MANAGEMENT INC. 82991956 WATER CONTROL LABORATORIES HOPKINTON INDUSTRIAL PARK 106 SOUTH ST. HOPKINTON, MA 01748 508-435-6824

V-10391.9 (SS-1) FORT DEVENS SOIL REM

AYER MA

REFERRED BY:

GOLDBERG, ZOINO & ASSOCIATES 320 NEEDHAM ST.

00:00 19:11

10/21/88 10/25/88 10/27/88

16:06

NEWTON UPPER FALL, MA

	FINAL REPORT		Con						
							= 1,9/1 = 1,9/1	East Sept	W.
- Z	* GENERAL INFORMATION				7		1		-
	(COLLECTOR: GZA)		I					
	•	1				in and the			
**	* ORGANIC TESTING (SC	OIL				A STATE OF THE STA			-
120	ET HYDROCARBON (IR)	26 	MG/KG A FINAL F	 	***				
;		inis is	A PINAD I	i	•				
		ļ ļ							
	-					Access to the property of			3
		•	•	İ		Sec. 12.7-11	1		10.500
į					•	1. 7 · 2. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1.			Tarantifa
			,			Life (All orders in consumation of the commission of property in only in	· i		7.00
				1			ļ		re Reger.
				1		1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1			4
				İ					
						The second of th	İ		
						market a character was			
				1		The state of the s			
+						The second secon			
.		1				marine district			
		1		!					1.00
mi:				•		200 man 100 mm			- "
:		t t		i i		2 in a second of 100 in a			
							·		
		ŀ					i i		1000
		 				AND REAL PROPERTY.		٠.	
		İ				THE TAKE THE STATE OF			
İ								* * *	
		-					1 1		
							j		
:		1						المان المان جيم والمعينية بالميكور الميكور ا المعادل الميكور الميكور الميكور الميكور الميكور الميكور الميكور الميكور الميكور الميكور الميكور الميكور الميكور	Salar
			•			-		recommendation of the control of the	
-								The second secon	
			<i>;</i>			24-3-37-5-	Television of the contract of	 manufacture and place. 	B Carl Principles
_		, ,		1					
						trade mounty	Street Walder	100 mg 1 mg 1 mg 1 mg 1 mg 1 mg 1 mg 1 m	
					м	ass. Cert. No. 313	Conn Cert No	o. PH-0515 ● EI	PA ID No.



WATER CONTROL LABORATORIES A DIVISION OF COOPERATING MANAGEMENT INC. 82991955 HCPKINTON INDUSTRIAL PARK 106 SOUTH ST. HCPKINTON, MA 01748 508-435-6824

V-[039[.9 (SS-2) FORT DEVENS SOIL REM

AYER MA

REFERRED BY:

GOLDBERG, ZOINO & ASSOCIATES 320 NEEDHAM ST.

NEWTON UPPER FALL, MA

00:00

19:11

E-POHOE,	FINAL F	REPORT		C				w lacetowice
	(V) VII≘iCak						COMPANY CHESTIFIES	
	NERAL INI COLLECTO	TORMATION)					
*** ORG	GANIC TES	ON (IK)	39	MG/KG				Same a confidence of the confi
:		***	THIS IS	A FINAL I	REPORT. ***	Tradition of the common of the		
	_					The second secon		Comment of the second s
				·				
i						Management of the second of th		Part of the Control
		·	-				. 	To the second se
							ļ ·	
	•					ANGELIE CONTROL OF THE STATE OF		
						Residence of the second		
						Applied State of the Control of the		
:								
.								
				,				
	The state of the s			Ž.		52 - 52 - 52 - 52 - 52 - 52 - 52 - 52 -		
Security of the second	The second secon					August San No. 313 a G	Conn. Cert. No. PH-0515	EPA ID No.



ಾಗಿ ಜನಿ ಇದೇ ಬರು ಎಂದು ಎಡವರು ಪ್ರಕ್ಷಿತ ಎಂದು ಎಡಡಿ A DIVISION OF COOPERATING MANAGEMENT INC. HCPKINTON INDUSTRIAL PARK 106 SCUTH ST. HOPKINTON, MAI01748

82991954

000504

V-1039.9 (SS-3) FORT DEVENS SOIL REM

AYER MA

REFERRED BY:

GOLDBERG, ZOINO & ASSOCIATES

320 NEEDHAM ST.

NEWTON UPPER FALL, MA

10/21/88 10/25/88 10/27/88 00:00

19:10 16:05

FINAL REPORT				٠	
	Heating to the same of the sam		A-VGT	inegrames -pasitive des	
*** GÉNERAL INFORMATION (COLLECTOR: GZA	'				
*** ORGANIC TESTING (SO	IL		<u>-</u>] [
PET HYDROCARBON (IR)	110 MG/KG THIS IS A FINAL REPORT. ***				
	THE TO IT THAN ASSOCIA	Little Land Committee Comm			TO LEET
				ļ.	
		altical acceptant for a			American dell'imi
	;		•	<u> </u>	
1					
		Comment of the Commen	•		المراجعة المراجعة المراجعة المراجعة المراجعة المراجعة المراجعة المراجعة المراجعة المراجعة المراجعة المراجعة ا المراجعة المراجعة ال
•					
					ESTERNAL SECTION
The second second second		ne de la companya de la companya de la companya de la companya de la companya de la companya de la companya de La companya de la companya de	. 1		10000000000000000000000000000000000000
		ALTONIA A	<u> </u>		
		AND THE STATE OF T			
		Surgery and the			
				· · · · · · · · · · · · · · · · · · ·	
	!				
			,	44 4 1	Minimal
			•		
			1 (1967) 2 (1967) 2 (1967) 1 (1967)		
				and the second	
_	, I		Aller Community of the	Commence of the commence of th	
	,*		and the second s		
_			ر دور وسیده در در در در در در در در در در در در در		
	Mass	. Cert. No. 313		. PH-0515 • EPA	



A DIVISION OF COOPERATING MANAGEMENT INC. 82991957 HOPKINTON INDUSTRIAL PARK 106 SOUTH ST. HOPKINTON, MA 01748 508-435-6824

FORT DEVENS SOIL REM

AYER MA

REFERRED BY:

GOLDBERG, ZOINO & ASSOCIATES

320 NEEDHAM ST.

NEWTON UPPER FALL, MA

CINERAL INFORMATION (COLLECTOR: GZA) *** ORGANIC TESTING (SOIL PET HYDROCARBON (IR) 507 MG/KG **** THIS IS A FINAL REPORT. ***	. ;
(COLLECTOR: GZA) **** ORGANIC TESTING (SOIL PET HYDROCARBON (IR) 507 MG/KG **** THIS IS A FINAL REPORT. *** GROWN COLLEGE OF THE COLLEGE	
*** ORGANIC TESTING (SOIL PET HYDROCARDON (IR) 507 MG/KG *** THIS IS A FINAL REPORT, *** **** **** **** **** **** **** ****	
PET HYDROCARBON (IR) 507 MG/KG *** THIS IS A FINAL REPORT. *** **** **** **** **** **** **** ****	i i i
*** THIS IS A FINAL REPORT. *** THIS IS A FINAL REPORT. ** THIS IS A FINAL REPORT. *** THIS IS A FIN	1000
	The second secon
	Control of the Contro
	Transfer of the contract of th
	ا د - ۲. وولسان . مارم والمسان .
	egran se
# 25 Control of the C	
Control of the contro	1771/100
Control of the contro	The second of th
The state of the s	
The state of the s	V 100
Secretary by 1956 at 1 Characters are recorded to 1 Characters a	The service of the se
Control of the contro	* Contraction
The state of the s	Service Control
The second secon	
	1200 AND AND AND AND AND AND AND AND AND AND
The state of the s	A STATE OF THE PARTY OF THE PAR
	17.75
Professional Control of the Control	125.50
	41.51
	33.43
	7200
The state of the s	



WAVER CONTROL LABORATORIES ADMINISTRATION OF COOPERATING MANAGEMENT INC. 82991953 HOPKINTON INDUSTRIAL PARK 106 SOUTH ST. HCPKINTON, MA 01748 505-435-6824

V-10391.9 (55-5) FORT DEVENS SOIL REM

AYER MA

FERRED BY:

GOLDBERG, ZOINO & ASSOCIATES

320 NEEDHAM ST.

NEWTON UPPER FALL, MA

00:00

19:09

16:05

FINAL REPORT

ENERAL INFORMATION (COLLECTOR: GZA |) *** ORGANIC TESTING (SOIL PET HYDROCARBON (IR) 115 *** THIS IS A FINAL REPORT. ***



WATER CONTROL LABORATORIES A DIVISION OF COOPERATING MANAGEMENT INC. HOPKINTON INDUSTRIAL PARK

106 SCUTH ST. HOPKINTON, MA 01748 508-435-6824

V-10391.9 (SS-6) FORT DEVENS SOIL REM

AYER MA

ERRED BY:

GOLDBERG, ZOINO & ASSOCIATES

320 NEEDHAM ST.

10/21/88 10/25/88 10/27/88 00:00 19:12

16:06

NEWTON UPPER	FALL, MA			
FINAL REPORT				- \
				C
** GENERAL INFORMATION		1.00 (
(COLLECTOR: GZA)	And the second s		the second second
** ORGANIC TESTING (SC	TL	24.5	İ	Services
PET HYDROCARBON (IR)	380 MG/KG			
**	THIS IS A FINAL REPORT. ***	ASSESSED AND AND AND AND AND AND AND AND AND AN		Control of the Contro
				ารได้แบบสมาชิง จ การบุคคร (พุทธ) (ค. 1 เมษาย์ (พิมพิโต เพิ่ม
		The second secon	ĺ	de es das presentes en la companya de la companya d
		A separate services of the ser		
·		Service Control of the	<u> </u>	allinerie
			İ	
•				2000
		And the second s		
_		The state of the s	į	ung a grandelia
		Park and an inches		Committee of the commit
				100 (20 (20 (20)
_		Control of the		AND STATE
	·	(1) (1) (1) (1) (1) (1) (1) (1) (1) (1)		- 10 - 10 - 10 - 10 - 10 - 10 - 10 - 10
_				
•		The second control of the second of		
				5-20171 PG-
		100 100 100 100 100 100 100 100 100 100		
		And the second		AND STREET
		The second secon	1	
_				
	·			100000000000000000000000000000000000000
_				100
		A THE STATE OF THE STATE OF	وما والماد ا	
			1	18 THE
	*	E PART NO	The second secon	22.2
		100	The second secon	
				17.7
			The state of the s	